# CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
# SAN DIEGO REGION
(SDRWQCB)

## SUPPLEMENTAL ENVIRONMENTAL PROJECT APPLICATION FORM

Project Requested by JRMC Real Estate, Inc. and City of Escondido

Name of Project Escondido Creek Watershed Invasive Species/Erosion Control Program (ISECP) - Stormwater SEP

Date of Request November 9, 2005

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**PROJECT SUMMARY**

This Supplemental Environmental Project (SEP) includes the development and partial implementation of a programmatic plan to implement bioengineering solutions to stream bank and bed erosion within the Escondido Creek watershed and contribute to the ongoing exotic invasive species control efforts of the San Elijo Lagoon Conservancy (SELC). The SEP is proposed to be funded in the amount of $225,000 with up to an additional $4,200 being provided outside of the SEP funding to provide for RWQCB staff funding as may be required to provide review and oversight services.

The SEP work is focused on reduction in the amount of sediment discharged to San Elijo Lagoon, a system recognized under CWA section 303(d) as an impaired waterbody for sedimentation/siltation. The effort contemplated under this SEP includes four principal components of work that are to be accomplished by Merkel & Associates and the San Elijo Lagoon Conservancy. The work is outlined briefly as follows and further discussed within this application package:

1) Inventory stream erosion and develop a programmatic tool kit of corrective actions applicable to the Escondido Creek watershed.
2) Select one area of significant channel erosion and implement a pilot demonstration project of bioengineering bed and bank stabilization.
3) Conduct an evaluation of the stabilization effectiveness and calculate benefits of project using multiple factors.
4) Contribute residual funding, beyond that necessary to accomplish the above work, to the on-going invasive species program being conducted by the SELC. Recognizing that this program is comprehensive to the entire Carlsbad Hydrologic Unit, funds derived from the present SEP shall be restricted in their use to the Escondido Creek Watershed.

In addition to discrete actions, the SEP anticipates participation in on-going efforts to improve the watershed through exotic species removal. The San Elijo Lagoon Conservancy has been funded for $3.96 million of a $5 million dollar effort. While SELC is presently seeking to fill the $1 million shortfall in the project budget, these funds are not yet secured and as such, funding through this SEP can be put to use within the existing invasive species control program infrastructure without project start-up costs. The anticipated cost distribution for the work elements outlined above are as follows:

**TOTAL LIFE CYCLE COST FOR THE PROJECT**

| | |
|---|---|
| Problems Inventory and Tool Kit Development | $ 70,000 |
| Select and Implement Demonstration Project | $ 75,000 |
| Monitoring and Performance Evaluation | $ 10,000 |
| Escondido Creek Watershed Exotics Control | $ 70,000 |
| **Total Project Cost** | **$ 225,000*** |

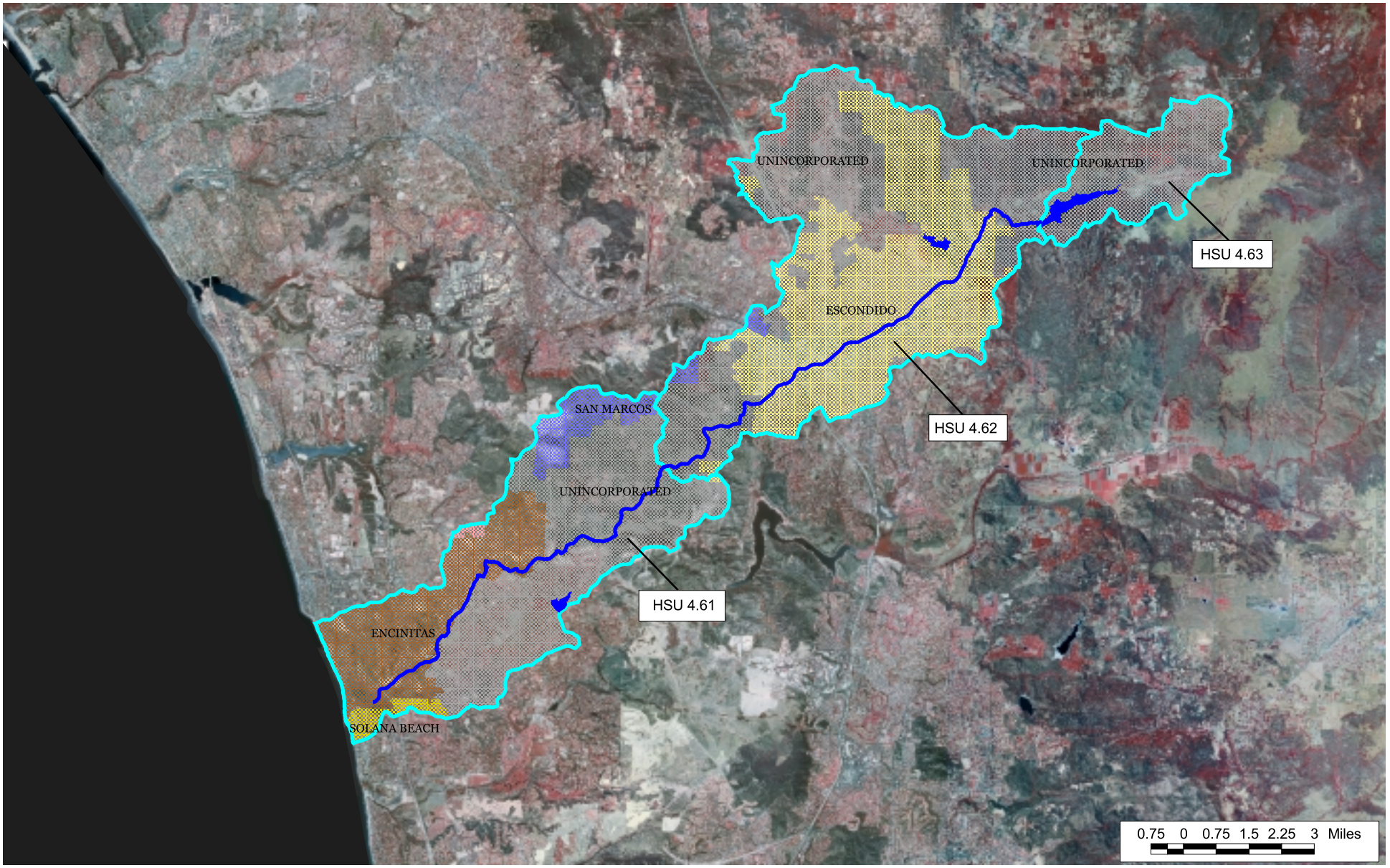
*The SEP proposal contemplates an additional $4,200 being made available for use by Board staff to cover costs for review and oversight. Should any portion of these funds not be expended by the Board staff, the residual funding will revert into the SEP for implementation of elements that are scaleable to the funding resources available.

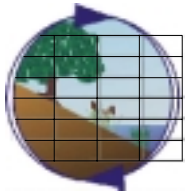
**WATERSHED/WATER BODY/LOCATION FOR PROJECT (ATTACH MAPS)**

The Escondido Creek watershed is the largest and most complex system within the Carlsbad Hydrologic Unit. The watershed extends from approximately 24.61 miles inland from the coast and totals 54,112 acres in area (85 square miles). Escondido creek originates in Bear Valley, in the north central San Diego County and discharges into the Pacific Ocean via San Elijo Lagoon. Three main reservoirs are located within the Watershed and include: Lake Wohlford, Dixon Lake, and San Dieguito Reservoir (Figure 1).

The Escondido Creek watershed is divided into 3 basins (Figure 1). The upper basin extends upstream from the Lake Wohlford Dam and includes Lake Wohlford, Bear Valley, the upper reaches of Escondido Creek and the surrounding hills. The central basin includes the area downstream from Lake Wohlford Dam to the lower end of San Elijo Canyon. Downstream of Lake Wohlford, Escondido Creek travels through a steep rocky gorge before joining with a small tributary from the north and then entering the large, relatively flat valley occupied by the City of Escondido. The northern portion of the central basin, north of the City of Escondido, is characterized by rugged undeveloped hills that include Daley Ranch and Dixon Lake. The City of Escondido occupies the central portion of the central basin. Within this portion of the central basin, the Watershed is primarily contained within concrete flood control channels. The lower portion of the central basin is San Elijo Canyon. The lower basin extends from the southern portion of San Elijo Canyon to the Pacific Ocean via the San Elijo Lagoon.

The majority of the Escondido Creek watershed lies within the unincorporated lands of San Diego County; however, several municipalities also share an interest in the watershed including the City of Escondido. The cities of Encinitas and Solana Beach occupy the western edge of the watershed extending inland, north of Escondido Creek, to Rancho Santa Fe Drive. A tiny portion of the City of Carlsbad also enters the watershed within this area. The southern edge of the City of San Marcos enters the watershed along its northern edge. The proposed SEP includes elements that would be located throughout the Escondido Creek watershed (HSU 4.61 through 4.63).



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**Escondido Creek Watershed - Stormwater SEP**

**Figure 1**

*Merkel & Associates, Inc.*

**PROJECT PROPOSED START DATE AND TIME LINE**

| | |
|---|---|
| December 2005: | Authorization of SEP |
| February 2006: | Work Plan* |
| February 2006: | Initiate Field surveys to inventory areas of substantial creek erosion |
| May 2006: | Draft erosion inventory and bioengineering tool kit report* |
| May 2006: | Site selection for pilot bed and bank demonstration project* |
| July 2006: | Final erosion inventory and bioengineering tool kit report |
| August 2006: | Permitting/environmental review for demonstration project |
| September 2006: | Initiate demonstration project implementation |
| October 2006: | Complete demonstration project implementation* |
| December 2006: | Fund SELC exotics program for work to commence March 2007 |
| April 2007: | Conduct 1-year evaluation of erosion control demonstration project |
| April 2008: | Conduct 2-year evaluation of erosion control demonstration project |
| June 2008: | Prepare performance assessment report of demonstration project* |

*Board staff review milestone opportunity

Organization Sponsoring Project (tax I.D. #) JRMC Real Estate, Inc. #01-0640855

Name of Project Manager James McCann Phone (760) 781-5300

Designated Project Trustee Merkel & Associates, Inc., (Keith W. Merkel, Trustee)

**DESCRIPTION OF PROJECT TRUSTEE CAPABILITY OR COMMITMENTS TO ENSURE THAT THE PROJECT WILL BE COMPLETE**

Merkel & Associates, Inc. (M&A) is a San Diego-based environmental consulting firm with expertise in biological analyses, planning, and restoration. With a full-time staff of over 40, the firm has the capacity to provide all of the necessary expertise and depth of resources to conduct the proposed investigations and habitat enhancement proposed in this SEP.

M&A has a proven track record for accomplishing the types of work called for in this SEP as evidenced by the completion of the similar planning effort for the *Otay River Watershed Tamarisk and Giant Reed Control Program* for the much larger Otay River watershed, as well as the preparation and implementation of dozens of large scale restoration and resource management efforts throughout southern and central California. The firm has also served to provide the biological elements to numerous watershed planning efforts including: the San Diego River Watershed Management Plan, the Santa Margarita Watershed Management Plan, the Rose Creek Watershed Management Plan, and most importantly, the Carlsbad Watershed Management Plan, for which the Escondido Creek watershed is a part. M&A has implemented over 100 acres of habitat restoration in the last 11 years, the majority of this has been the restoration of wetland habitats and upland habitat buffers along stream courses. Perhaps most demonstrative of the firm's capacity and commitment to the implementation of the work proposed in the SEP may be seen in the past and current performance of M&A in the *Caulerpa taxifolia* eradication program for the Southern California *Caulerpa* Action Team (SCCAT), a program for which the firm has conducted similar work directly for the Board as well as other governmental and non-profit entities.

The work to be performed would be accomplished by two of M&A's three divisions - terrestrial biology division and habitat restoration division. The terrestrial division specializes in conducting

biological resource inventories, sensitive resource studies, habitat management planning, and GIS-based assessments and mapping. The terrestrial division provides the necessary expertise to provide the natural resource inventory and management planning necessary for the project, drawing from both original field work to be conducted as well as prior work performed for the watershed planning efforts as well as management plans prepared for such areas as the NCCP Daley Ranch Preserve in northern Escondido. The habitat restoration division will provide expertise on the physical aspects of implementation of the restoration elements proposed and will contribute both to the development of the ISECP as well as the implementation tasks to be conducted under the ISECP.

As an established biological firm incorporated in October 1994, M&A has the entire essential infrastructure necessary to manage all aspects of the proposed work, including technical elements, quality control, and business management activities. The firm has demonstrated this capacity on numerous programs conducted under contracts with public and private entities, grant programs, and even under funds provided through the SWRCB Clean-up and Abatement Account. M&A will manage the activities under this SEP as it would other projects including the use of such management tools as schedule and budget tracking, quality control and oversight, interim and final milestone deliverables.

**Statement of Project Trustee ability/authority to receive funds and disburse funds**

M&A is an incorporated firm that has the capacity to receive funds and disburse funds as necessary to implement the proposed work. The firm shall maintain strict cost accounting in accordance with general accepted accounting practices (GAAP). Accounting records for the project shall be available for inspection by the Board as well as the project sponsor as may be requested. The program assumes that entire funding necessary to accomplish the outlined work will be provided to the Project Trustee by JRMC, the Project Sponsor, upon Board approval. Funds will be disbursed as they are spent. Any interest earned on undisbursed funds will be invested back into the SEP project.

**DETAILED PROJECT INFORMATION**

***1. Proposal Description***

This project includes the development and partial implementation of a programmatic plan to control erosion and sediment discharge to San Elijo Lagoon through the implementation of bioengineering solutions to stabilize stream bank and bed erosion within the Escondido Creek watershed. The SEP also includes partial funding of the outstanding exotics control needs within the watershed through participation in the SELC's ongoing Riparian Wetland Restoration of the Carlsbad Hydrologic Unit project, an effort that is partially supported, but not fully funded by Proposition 13 grant funds.

By funding the SELC exotics control program and collaborating with SELC on selection of the most strategic areas for implementation of a pilot demonstration project for bioengineering stabilization, M&A will be able to garner the greatest benefits out of the available SEP funds. Given that many of the worst areas of channel erosion within the Escondido Creek watershed also suffer from exotic species infestation, many of which have contributed substantially to the erosion problems, the SELC's exotics control efforts will be leveraged in a manner that allows bioengineering efforts to be expanded as far as practical within the available funding. Further, the SELC's ongoing high profile participation in the watershed will assist in fostering the long-term adoption and expansion of bioengineering application tools that are effectively demonstrated though this effort.

The present project will include an inventory of stream erosion problems within the Escondido Creek watershed and development of a programmatic toolkit of bioengineering solutions for erosion stabilization within the watershed. This program will identify areas of significant streambed and bank erosion throughout the watershed and will classify and rank priorities for corrective actions. The effort will also identify potential stabilization tools that may be employed at each erosion area.

From the identified erosion problem areas, one or more pilot demonstration project sites will be selected. The selection of sites will be based on the following criteria:

- Potential benefits to stabilizing active bed and bank erosion and curbing sediment transport downstream;
- Opportunities for employing several different stabilization tools in order to maximize demonstration benefits;
- Site accessibility and willingness of owners to allow work to be performed and follow-up assessment to be conducted;
- Permittability of the work effort given existing resources and regulations, and;
- Opportunities to leverage existing restoration efforts either on-site or off-site to maximize the extent of work that can be performed under the budget available.

At present, two sites are under consideration for implementation of the pilot demonstration program, however other candidates may be identified and ultimately be selected. Board staff will have an opportunity to participate in this selection. The first identified candidates site is Daley Ranch in northern Escondido. This site is a favorable location due to its high profile public ownership, range of streambed and bank erosion conditions thus creating opportunity to employ a number of different treatment strategies. The second site is a private parcel located in the Harmony Grove area of San Diego County approximately 1 mile downstream of the ERTC project site for which SEP funds are to be provided. This site is a favorable candidate for implementation of the pilot demonstration project in that it has been identified by the San Elijo Lagoon Conservancy as one of or the greatest contributors of sediment to the lagoon through channel erosion. The creek channel at this site has experienced channel incisions of approximately 12 feet. Further, this area has already been the focus of extensive exotic species control efforts and thus the area is in an ideal condition for focused bed and bank stabilization to be performed. While the site is in private ownership, the SELC has indicated that the property owner is a willing supporter of stream restoration efforts and has previously indicated a willingness to provide site access for stream restoration purposes.

Following the implementation of bank and bed stabilization under the pilot demonstration project, monitoring is proposed following two winter storm seasons. Monitoring will consist of evaluation of the following: 1) stream section morphometric analyses of change compared to comparable untreated segments; 2) evaluation of volumetric loss of sediment from the sections; and 3) habitat characteristics analyses within the treated and untreated areas of the stream. Water quality monitoring is not proposed since it is anticipated that monitoring will be conducted under low flow conditions and sediment generation from bed and bank erosion will allow for an assessment of sediment yields to downstream areas.

Finally, the project will contribute SEP funds to the ongoing SELC exotics control program within the Escondido Creek watershed. These funds would go towards the continued implementation of

work that has not been funded under Proposition 13. Use of these funds is expected to occur beginning in March 2007 after the Proposition 13 funds are exhausted. The present SEP funds are anticipated to be used principally for retreatment of area as necessary to accomplish the exotics removal objectives. The application of these funds shall be governed by the SELC's comprehensive control plan.

Separate funding has been identified to be used for funding Regional Board staff for purposes of oversight review. However, as M&A presently maintains well-established practices for internal project tracking and management controls and the San Elijo Lagoon Conservancy has in place a well defined program for the exotics species control efforts, it has not been assumed that all funds provided for this purpose will necessarily be expended. For this reason, and at the request of Board staff, M&A has established the funding for Board staff oversight in a manner that allows for unexpended funds to default to program implementation if all funds are not used by the Board for the purposes of oversight and tracking.

### *2. Problem Statement*

The Escondido Creek watershed suffers from degradation of the natural tributary system as a result of extensive urbanization exacerbating runoff rates and peak discharge velocities, channelization of several segments of the drainage system, and infestation of many drainage courses by dense invasive vegetation. The increased discharge from the watershed combined with the increasing channel roughness associated with invasive species infestation has resulted in exacerbation of channel bed and bank erosion and sediment transport. These factors are greatly contributing to sedimentation in the receiving waters of San Elijo Lagoon and the lagoon is now designated as impaired for sedimentation/siltation under section 303(d) of the Clean Water Act. The degradation of the drainage system by exotics and erosion is also contributing significantly to the deterioration of recreational and habitat-based beneficial uses designated in the including REC 2, WARM, COLD, and WILD. The accumulation of sediments within San Elijo Lagoon further results in the degradation of additional beneficial uses at the lagoon.

### *3. How Will The Project Benefit Water Quality and Beneficial Uses?*

Invasive species infestations are recognized as second only to habitat loss as the greatest risk to worldwide biodiversity. The impact of exotic infestations on native habitats and associated species within Escondido Creek has been well documented (Carlsbad Watershed Management Plan). However, in addition to the impact on biota, the hydrology and hydraulics within Escondido Creek and its tributaries has been substantially altered by several factors, including blockages by exotic species. These blockages have exacerbated erosion and increased downstream sedimentation.

The implementation of the proposed SEP would make significant progress in re-establishing the hydrologic and ecological functions of the Escondido Creek watershed through the control and removal of invasive target species using the most effective means available and establishing practices for soft stabilization of stream bank and bed erosion areas where feasible. In addition, it would reduce anticipated future consequences of exacerbated erosion and sediment transport to downstream areas, and loss of native biodiversity along the riparian corridors. Beyond the direct benefits of this project, continued implementation of a strategic invasive species/erosion control program will help protect the extensive investment presently being made to control exotic species using Proposition 13 grant funds.

It is further hoped that a demonstration of effective bioengineering tools within the watershed will result in a greater acceptance of such alternative stabilization methods in the region. Presently bioengineering has been embraced to a much greater extent in wetter climates where greater vegetation cover and growth rates are seen. However, the drier climates of southern California have tended to limit both the applicability of existing technologies as well as the acceptance as alternatives to harder engineered solutions to bed and bank erosion. Successful demonstrations of bioengineering tools adapted to the region along with the continued pressures of regulatory and environmental concerns to reduce hard engineering of channels will foster a greater adoption of these principals and strategies within the region. At present, very valid criticisms are levied against application of bioengineering technologies in the region based on the lack of climate adapted demonstrations of success. This project is intended to assist in responding to these concerns.

### *4. How Will The Success of this Project be Measured?*

Success of the program will be measured in three ways.

The first will be the development of a comprehensive planning document that will do the following: 1) identify and locate erosion problem areas within the Escondido Creek watershed; 2) identify methods for approaching the problems through bioengineering solutions; and 3) prioritize and identify optional actions for greatest and longest lasting overall benefit to stream erosion stabilization.

The second measure of success will come in the evaluation of the performance of the pilot demonstration project of bioengineering techniques. This evaluation will allow for a qualitative and quantitative assessment of performance of bioengineering tools in curbing erosion, trapping and retaining sediment, expanding habitat values, and reducing channel bank losses. These benefits may be considered relative to the calculated costs of sediment removal from San Elijo Lagoon, lost land values within eroding regions, and riparian habitat loss and degradation using either habitat value or monetary metrics.

The final measure of success is the extent of exotics control within the watershed that may be accomplished using the allocated funds to the SELC exotics species control program. Using the funding earmarked for this effort, it is anticipated that approximately 10 acres of new exotic species treatment may be accomplished or approximately 5 miles of stream course may be retreated following the initial treatment. While these estimates are rough and highly dependent upon the extent of treatment need, the magnitude of treatment possible is significant. The final metric of success for this element of the SEP will be a summary letter report identifying the extent of exotics control treatment accomplished using the funds provided.

**DETAILED WORK PLAN**

The Escondido Research and Technology Center (ERTC) and the City of Escondido have been cited for discharge of sediment into the waters of Escondido Creek as a result of construction stormwater management violations. As a Supplemental Environmental Project (SEP) that benefits resources that may be adversely impacted by sediment discharge, the proposed program would provide for the development and partial implementation of strategy to control streambed and bank erosion within the Escondido Creek watershed. The program would also provide funding for the continued implementation of exotic species control beyond that which has already been funded under Proposition 13 grant funds. The work under this SEP will be undertaken by Merkel & Associates and the San Elijo Lagoon Conservancy. This effort contributes to the improvements of the watershed in a manner that directly focuses on the types of impacts anticipated to have occurred as a result of ERTC stormwater discharges by seeking and implementing methods to stabilize erosion using bioengineering tools where they may reasonably be applied. The effort also contributes to the on-going efforts to curb exotic infestations which both result in direct degradation of habitat-based beneficial uses as well as exacerbating erosion as a result of hydraulic impairments to the natural drainage system.

. The bioengineering elements will build on techniques developed by M&A for the Rose Creek Watershed Plan as well as for the Lower Rose Creek Enhancement Plan. It will also include the further development of streambank bioengineering tools that have been applied more extensively in moister climates of Central California and the Pacific Northwest. The invasive species control strategy will follow that developed by the San Elijo Lagoon Foundation for the comprehensive Riparian Wetland Restoration of the Carlsbad Hydrologic Unit.

***Components of the proposed SEP are as follows:***

1) Identify the and characterize areas of erosional degradation of streambeds and banks;

2) Review the established methods for bio-engineering stabilization and restoring erosion damage that would minimize or avoid hardscape features and recommend methods for application within the Escondido Creek watershed given local considerations;

3) Identify candidate sites for implementation of pilot demonstration bioengineering solutions.

4) Select a site for bioengineering stabilization of streambed and bank areas, complete necessary environmental documentation and permitting, and implement the pilot program.

5) Monitor and assess the effectiveness of the bioengineering demonstration project and document the results for future application as a reference for other opportunities.

6) Contribute to the exotic species removal efforts presently underway within the Escondido Creek watershed.

***Expected Outcomes from the SEP***

1) Development of a programmatic document that may be used to strategically guide the restoration of channel bed and bank erosion within the Escondido Creek watershed.

2) Implement bioengineering methods for channel restoration within a pilot demonstration site where measurable sediment erosion and transport reduction may be documented and assessed both for the individual benefits of the demonstration project as well as the informational benefits to expanded regional application of proven bioengineering tools.

3) Contribute to on-going exotic species control efforts in a manner that results in approximately 10 new acres of invasive species treatment or 5 miles of stream course retreatment.

4) Because implantation of the program is only partially contemplated under this SEP, it is anticipated that future implementation will be necessary as an ongoing effort. For this reason, the program contemplates development of infrastructure that will assist in continuing the efforts in the future using grants, SEPs, restoration mitigation projects, and community-based volunteer programs.

### B. BUDGET

It is anticipated that the SEP funding available to this program will be $225,000. Because the effort is scalable to the funding available, future funds could be employed if available from other sources.

The anticipated allocation of SEP funds is outlined in Table 1. In addition, California Regional Water Quality Control Board staff oversight cost reimbursement is proposed based on the anticipated review and comment appropriate to the scale of the task. In the event, the Board does not utilize the funds allocated for review purposes, the unused monies would be transferred to assist with the implementation of the scaleable elements of the SEP.

Cost allocation is based on the information developed and budgeting performed at this time. It may be necessary to reallocate budget funds as greater information becomes available regarding the implementation of the work under the SEP. If budgeted funds are reallocated between major elements of work, this reallocation will be done through coordination and agreement between M&A, SELC, and Regional Board staff.

**Table 1. Anticipated cost allocation for the Escondido Creek Watershed Invasive Species/Erosion Control Program (ISECP) – Stormwater SEP**

| Task | Cost |
|---|---|
| **1. Problems Inventory and Tool Kit Development** | **$70,000** |
| a. Work Plan Development | $1,000 |
| b. Conduct field inventories of channel erosion areas | $48,000 |
| c. Characterize, rank, and prioritize areas for stabilization action | $4,000 |
| d. Develop bioengineering tool kit for identified erosion conditions | $13,000 |
| e. Prepare report identifying erosion problems, solutions, and recommendations | $4,000 |
| | |
| **2. Select and Implement Demonstration Project** | **$75,000** |
| a. Identify and characterize highly suitable candidate site for demonstration project | $3,000 |
| b. Select bioengineering pilot demonstration site and develop project description | $1,000 |
| c. Finalize engineering plans for the proposed work | $13,000 |
| d. Prepare environmental document and process necessary permits | $9,000 |
| e. Implement demonstration project | $49,000 |
| | |
| **3. Monitoring and Performance Evaluation** | **$10,000** |
| a. Year 1 Field Performance Assessment | $3,200 |
| b. Year 2 Field Performance Assessment | $3,000 |
| c. Performance Evaluation Report for Demonstration Project | $3,800 |
| | |
| **Escondido Creek Watershed Exotics Control Program** | **$70,000** |
| | |
| **RWQCB Saff Oversight *** | **$4,200** |
| **TOTAL:** | **$229,200** |

*Any and all funds not used by RWQCB staff would revert to implementation phases

## C. TASK DESCRIPTIONS

The proposed SEP would be developed and partially implemented in accordance with the following tasks and subtasks.

### 1. STREAM EROSION PROBLEMS INVENTORY AND TOOL KIT DEVELOPMENT

#### *a. Work Plan Development*

Under this task, a work plan would be prepared that provides a detailed outline of the elements to be completed through the course of the program. This plan would include an identification of the schedules, milestones, and tracking program for each task to be completed. This task would be conducted within 45 days of Board action authorizing the SEP. The work plan would be made available for Board staff review.

#### *b. Conduct field inventories of channel erosion areas*

Under this task a field investigation would be conducted to survey the watershed drainage systems and document streambed and bank erosion. The program would include the mapping of areas of significant erosion and collecting information as to the character of the erosion conditions using prepared forms that identify the conditions and extent of erosion, the degree of channel incision, the scale of the erosion, and the surrounding resources. Maps will be prepared using ArcView GIS.

#### *c. Characterize, rank, and prioritize areas for stabilization action*

Using the data collected through field investigations, a numeric rating system would be used to characterize the types of erosion patterns, the scale of the issues, and the anticipated future erosion losses. These characteristics will be used to rank and prioritize needs for corrective actions.

#### *d. Develop bioengineering tool kit for identified erosion conditions*

Using the information regarding the types of erosion conditions existing within the watershed as well as published information on bioengineering strategies, an appropriate set of treatments will be developed and standard details developed to fit the needs of the Escondido Creek watershed conditions. This will include the development of appropriate regional planting palettes, consideration of moisture needs, flow conditions, and soils existing in the watershed. The goals of the tool kit will be to provide details that may be drawn upon for repairs within Escondido Creek watershed or other similar watershed areas in the region.

#### *e. Prepare report identifying erosion problems, solutions, and recommendations*

This task would result in the preparation of a detailed report documenting the findings of the stream erosion surveys. The report would explain and graphically presenting the characterization, ranking, and prioritization of actions to correct erosion issues. Finally, the report will make recommendations for available repair treatments and types of situations in which the treatments would be best applied to the conditions within the watershed. Graphic maps will be prepared in ArcView GIS formats to be compatible with the SELC exotics species control program mapping efforts presently underway.

This report will be provided in draft and final version to the Board staff for review and comment.

## 2. SELECT AND IMPLEMENT DEMONSTRATION PROJECT

### *a. Identify and characterize highly suitable candidate site for demonstration project*

From the results of Task 1 work efforts, areas that are highly suitable candidate sites for implementation of a pilot demonstration project will be identified. At present there are two known candidates: Daley Ranch in northern Escondido and private parcels in Harmony Grove within unincorporated County of San Diego lands. The goal is not to develop an exhaustive list of candidate sites, but rather ensure that a good site is selected by developing adequate information to ensure that it is appropriate to proceed forward with the site.

This task would result in the collection of baseline data necessary to determine the best candidate site for implementation of a demonstration project. It is anticipated that information on land owner interest and commitment, utilities and easements, topography and erosion scale, existing resource constraints, and extent of contribution to downstream sedimentation will be factors considered.

### *b. Select bioengineering pilot demonstration site and develop project description*

Using the information collected on candidate sites for a demonstration project, a final selection will be made and a project description will be prepared for use in development of engineering plans and processing of necessary environmental documents and permits. This task will be accomplished with input from SELC and Board staff. Input will also be sought from resource and regulatory agencies as support for the pilot program site by these agencies will benefit the timeliness of permitting.

### *c. Finalize engineering plans for the proposed work*

This task includes the development of final engineering plans for the proposed pilot program effort. This work will draw upon the developed standard details to be developed under subtask 1d. Using these details, the specific site design will be engineered and details will be adapted to the specifics of the application.

### *d. Prepare environmental document and process necessary permits*

An environmental document will be prepared for the proposed pilot demonstration project. At present, it is contemplated that the work will conform to the necessary conditions for a categorical exemption under CEQA as a minor restoration project. It is assumed that the project will require the issuance of a streambed alteration agreement under section 1602 of the California Fish & Game Code. It is anticipated that the required work will also qualify for a nationwide permit under section 404 of the Clean Water Act. A state water quality certification under section 401 of the Clean Water Act will also be required. Under this task, the preparation of application packages and processing of these permits is anticipated to be completed.

### *e. Implement demonstration project*

This task includes all aspects of the physical implementation of the stream stabilization pilot program. All work including grading, construction, and revegetation will be performed under this task.

### 3. MONITORING AND PERFORMANCE EVALUATION

***a. Year 1 Field Performance Assessment***
***b. Year 2 Field Performance Assessment***

After implementation of the pilot demonstration project, follow-up monitoring is proposed following the first two consecutive winter storm periods. This monitoring is to be conducted in April of 2007 and 2008 to document the physical and biological performance of the project. The monitoring will include an assessment of channel morphology, sediment loss and accumulation, condition of any structural or non-structural stabilizing materials, biological habitat growth conditions, and resources using the project site. Similar data will be collected for a comparable untreated site in the same channel reach. Following the first year analysis, data are to be compiled and archived pending completion of the second year data collection efforts. After the second year of data collection an analysis of the results will be prepared under subtask 3c.

***c. Performance Evaluation Report for Demonstration Project***

Under this task, M&A will prepare an overall evaluation of the performance of the demonstration project. This analysis will include a documentation of the successes and failures of the effort. Effectiveness in stream erosion stabilization and sediment capture will be documented. The habitat conditions and values of the project will be documented. All of these characteristics will be evaluated against the performance of a similar untreated reference area that was monitored during the same period. The analysis will further evaluate the effectiveness of the effort based on project costs and costs resulting from not taking actions such as dredging of sediments from the lagoon, damage to the natural system, and loss of land and possible utility infrastructure as a result of bank and bed erosion.

### 4. ESCONDIDO CREEK WATERSHED EXOTICS CONTROL PROGRAM

This task is to be conducted by the San Elijo Lagoon Conservancy and consists of implementation of elements of the Riparian Wetland Restoration of the Carlsbad Hydrologic Unit within the Escondido Creek watershed. This effort is anticipated to include the continued efforts of control treatment and follow-up treatment of exotic invasive species under the on-going program. Funds are to be transferred from Merkel & Associates to the SELC in December 2006 and will be applied by the Conservancy to work progressing after March 2007 when Proposition 13 funds are expended and no longer available. With the funding available it is anticipated that approximately 10 acres of treatment or 5 river miles of follow-up retreatment may be accomplished under the present program. At the completion of work conducted with the available SEP funds, the SELC will provide a letter to M&A and the Board, documenting the expenditure of funds under the program.

### RESOURCE NEEDS

The implementation of this SEP requires no additional resources or support beyond that outlined in the SEP. M&A and SELC have all of the necessary capabilities to accomplish the proposed work and as such, there is no reliance on some other action in order to proceed.

### F. REGULATORY ISSUES (ENVIRONMENTAL REVIEWS, PERMITS, ETC.)

The Escondido Creek watershed lies within the unincorporated lands of San Diego County as well as multiple municipal agencies. CEQA environmental review will be required for the implementation of the demonstration project. The exotics control program has completed required CEQA review and is presently underway. For this reason, no additional review is necessary to conduct this element of work. This proposed SEP implementation tasks would require authorization from the California Department of Fish & Game pursuant to California Fish and Game Code, Section 1602 agreement for alteration of a streambed. Some elements of work may also require the issuance of a Clean Water Act (CWA) section 404 permit by the Army Corps of Engineers and a CWA, Section 401 state water quality certification by the Regional Water Quality Control Board. For the bioengineering demonstration project it will be necessary to obtain project specific permits. For the exotic species control efforts, the SELC presently has the required permits and authorizations to proceed with the required work. Landowner concurrence will be required for implementation of efforts under this program.

### G. SCHEDULE

| | |
|---|---|
| December 2005: | Authorization of SEP |
| February 2006: | Work Plan |
| February 2006: | Initiate Field surveys to inventory areas of substantial creek erosion |
| May 2006: | Draft erosion inventory and bioengineering tool kit report |
| May 2006: | Site selection for pilot bed and bank demonstration project |
| July 2006: | Final erosion inventory and bioengineering tool kit report |
| August 2006: | Permitting/environmental review for demonstration project |
| September 2006: | Initiate demonstration project implementation |
| October 2006: | Complete demonstration project implementation |
| December 2006: | Fund SELC exotics program for work to commence March 2007 |
| April 2007: | Conduct 1-year evaluation of erosion control demonstration project |
| April 2008: | Conduct 2-year evaluation of erosion control demonstration project |
| June 2008: | Prepare performance assessment report of demonstration project |

### H. WORK PRODUCTS AND DOCUMENTS TO BE RETAINED FOR RECORDS

All of the following documents would be prepared and submitted to the Board to be retained for the record. Merkel & Associates would also retain these documents. Documents include:

2. Work Plan
3. Draft erosion inventory and bioengineering tool kit report
4. Final erosion inventory and bioengineering tool kit report
5. Demonstration project plans
6. Demonstration project environmental document and permits
7. Demonstration project performance evaluation report
8. SELC letter documenting the use of exotic species control funds

## I. OTHER INFORMATION

### 1) General Project Attributes

Currently there is no inventory of streambed or bank erosion problems or plan to address these issues within the Escondido Creek watershed. The degradation of the creek channels and banks is believed to generate significant sediment supply which is transported downstream to San Elijo Lagoon, a water body designated as impaired as a result of sedimentation and siltation. While regulatory programs presently exist to address much of the out-of-channel sediment source generation, continued degradation of channels through channel incision, bank failures, and other storm generated losses fall outside of existing regulatory frameworks.

By first documenting the extent of channel bed and bank erosion within the watershed, it is hoped that the extent of the issue will be highlighted and greater resource focus on the problem may be attained. By recommending and demonstrating some alternatives to hardscape engineering solutions, it is intended that greater exposure of engineers and regulators to the possible options will encourage greater implementation of more benign channel stabilization measures in the future.

Finally, by participating in the regional exotic species control efforts it is intended that channel erosion resulting from blockage by exotic infestations will be reduced, making it less necessary to conduct further stabilization, while making it more effective and less expensive to perform stabilization where it is required. This participation also helps protect and leverage the investment in exotic species control that has already made under Proposition 13.

### 2) Water Quality Attributes

The proposed effort would focus on the reduction of sediment generation and transport within the creek system and thus provides direct benefits to improvements to a recognized impairment at San Elijo Lagoon. Through the control and removal of invasive exotic species within the watershed, the ongoing SELC control efforts will further benefit the reduction of erosion associated with channel blockages.

### 3) Beneficial Use (B.U. Attributes)

The proposed SEP focuses on drainage stabilization using less invasive techniques than are inherent in standard engineering methods. Using bioengineering tools, a greater degree of vegetation can be maintained and restored to eroding channel areas, thus improving the biological connectivity and habitat quality of riparian systems within the watershed. The program will also reduce the introduction of sediment to the San Elijo Lagoon and thus slow the rate of habitat decline in this waterbody. The participation in the control of exotic species further aids in the improvement of biologically-based beneficial uses. The high biomass accumulation from exotics can result in serious flow impediments and overbank flooding. It alters channel morphology by retaining sediments and constricting flows, thereby causing bank erosion and sediment transport as new flow paths are found around the vegetative barriers. Uprooted mats of exotic species form during floods and can cause severe damage where they block drainage facilities and result in erosion and exacerbated downstream sediment transport. Exotic species contribute both directly and indirectly to the loss of native habitat and floral and faunal diversity. First, the displacement of more diverse native habitats by homogeneous invasives results in a decline in native species diversity. Secondarily, the disturbance

caused by floodwaters working around invasive species channel blockages results in the erosion and loss of fringing riparian habitats as well as a transport of sediments to downstream areas.

The control and removal of target invasive species and stabilization of erosive areas using soft solutions where possible would aid in re-establishing the hydrologic and ecological functions of the Escondido Creek watershed.

**4) Monthly Program Attributes**

The project would include a number of document deliverables reporting on progress of the implementation of the work. These deliverables are anticipated to be available based on the schedule provided in this document.

**5) Public Education and/or Outreach Attributes**

It is understood that long-term success of the proposed plan would require outreach and education to engage the public in reducing factors that contribute to the sustaining of invasive non-native species. To achieve this, the work is to be dovetailed with the on-going exotic species program underway and managed by the SELC. M&A will actively coordinate the work with the San Elijo Lagoon Conservancy. Because of the SELC's ongoing efforts within the watershed, coordinating this effort with the efforts of the Conservancy will eliminate duplication of effort regarding public education and outreach programs.

**6) Clarity of Project**

The work proposed includes three major components. The first is the development of a comprehensive inventory of channel erosion problems within the watershed and identification of available bioengineering solutions that may be employed. The work is considered a follow-on companion effort to the watershed-wide exotic species control program presently underway.

The second element of work is the implementation of a pilot demonstration program for bioengineering stabilization of erosive channel areas. This effort includes a monitoring and performance evaluation element that will allow for a documentation of the effectiveness of the effort at reducing sediment generation and discharge to the downstream waters.

The final element is participation in the on-going exotic invasive species control efforts by funding follow-on work that extends beyond the available funding that has been dedicated to the effort through Proposition 13.

**7) Project Trustee/Applicant Attributes**

M&A has proven expertise in working with public agencies, as well as working for non-governmental organizations, and private utilities, companies, and individuals. M&A's experience in performing such work includes work under dozens of grants, mitigation programs, emergency response funds, etc. The firm has a well-established track record on such environmental projects as the Famosa Slough Wetland Treatment Ponds, the West Point Loma Marsh Restoration, various watershed plans, the Caulerpa eradication program, and major wetland and upland restoration and management programs. Included among the expertise offered by M&A are several projects that are

directly applicable and quite similar to the work proposed here. Projects indicating the capacity to perform the work including the technical and management needs include the following:

*Otay River Watershed Tamarisk and Giant Reed Control Program*

M&A prepared an exotic species control program covering the 145 square mile Otay River watershed. The plan included a comprehensive inventory of the watershed that resulted in the identification of 364 acres of tamarisk and 46 acres of giant reed scattered predominantly along well over a hundred miles of stream course. For this $8.3 million dollar effort, M&A analyzed options for species control, regulatory needs, project costs, funding opportunities, and long-term management strategies.

*Batiquitos Lagoon Long-term Biological Monitoring and Pilot Revegetation Program*

The Batiquitos Lagoon Enhancement Project is a 10-year biological monitoring program. This monitoring program and the associated eelgrass and cordgrass restoration program are the final phases of this massive $55 million habitat restoration project. The long-term monitoring program includes several elements ranging from vegetation trends analyses to detailed fisheries and avian resource studies. Included in the studies are sediment and water quality analyses, as well as benthic community development, including macroalgae and eelgrass habitats.

The Batiquitos Lagoon Long-term Monitoring Program includes quantitative and qualitative assessment of resources, documentation of trends, and presentation of data to resource and regulatory agencies and the public. Quarterly monitoring reports are being prepared as a means of rapid data transfer. Annual reports are to serve as a forum for data and trend analyses and interpretation.

*Famosa Slough Enhancement Plan*

M&A was responsible for creating and implementing a plan to restore and preserve the Slough as a natural habitat, provide a sanctuary for wildlife, and educate the public in the appreciation of the plants and animals that comprise a wetland system. The firm has subsequently implemented the two major elements of the Enhancement Plan under grant funding and has supported the Friends of Famosa Slough in accomplishing technical work at the Slough for over 10 years through volunteer and some funded work. The restoration efforts completed at the Slough include the design, permitting, and implementation of water quality treatment basins designed to collect and remove sediment, trash, and urban pollutants. The second major element includes the construction of an expanded salt marsh wetland habitat.

*Caulerpa taxifolia Eradication Program, Huntington Harbor and Agua Hedionda Lagoon*

M&A has been responsible for eradication efforts for *Caulerpa taxifolia*, which was discovered by M&A biologists in Agua Hedionda Lagoon in Carlsbad and later confirmed growing in Huntington Harbor. M&A senior biologists work closely and under the direction of the Southern California Caulerpa Action Team (SCCAT), made up of members from San Diego Regional Water Quality Control Board, Santa Ana Regional Water Quality Control Board, CDFG, National Oceanic & Atmospheric Administration (NOAA) Marine Fisheries, City of Carlsbad, U.S. Department of Agriculture, and others. M&A senior biologists are responsible for coordinating and participating in all aspects of the project, including SCCAT presentations, data management, research and development, fieldwork, outreach, and reporting. M&A biologists have coordinated with scientists from six other countries that have experience with the invasive nature of *Caulerpa taxifolia*, included 2 research expeditions in the Mediterranean Sea to study the later stages of the uncontrolled spread of the species. M&A biologists work with environmental groups, coastal cities, and recreational divers as part of an outreach program to educate about and search for invasive marine species.

**8) Funding Attributes**

A significant investment has been made by the people of the State of California and the member of the Carlsbad Watershed Network through the San Elijo Lagoon Conservancy to implement a comprehensive exotic invasive species control program. The work proposed under this SEP includes multiple elements that will foster the continuation of this effort beyond the funding now available and will further the restoration of the Escondido Creek watershed though jumpstarting the next logical element of work, the identification and repair of creek channels degrading due to erosion. The present activities and high investment in the restoration of Escondido Creek has provided a unique opportunity to leverage invested dollars through collaboration with the San Elijo Lagoon Conservancy to garner the greatest environmental benefits of investments made through this SEP. For this reason, the M&A and SELC are collaborating on the application of the available funds to promote both channel bank erosion stabilization and exotic species control effort.

I certify that the information provided in this application is an accurate and complete report of the costs, scope of work, and expectations of this proposed project I am submitting to the SDRWQCB.

Keith W. Merkel November 9, 2005
Merkel & Associates, Inc.
*Project Trustee*